

SPECIFICATION

TITLE OF THE INVENTION

5 IMAGE-SENSING METHOD AND APPARATUS,
 CONTROL METHOD AND APPARATUS THEREFOR, AND STORAGE
 MEDIUM

FIELD OF THE INVENTION

10 The present invention relates to an image sensing
 apparatus, that can be connected to an information
 processing apparatus via a data transmission/reception
 unit based on the USB (Universal Serial Bus)
 specification, and that has a function to release a
15 suspended status of the information processing apparatus
 by transmitting a resume signal, a control method for
 the apparatus, and a storage medium.

BACKGROUND OF THE INVENTION

20 In an image sensing apparatus such as a digital
 camera, an image signal obtained by an image sensing
 device such as a CCD is converted into a digital image
 signal by an A/D converter and a signal processing unit.
 Then compression using the JPEG (Joint Photographic
25 Expert Group) method or the like is performed on the
 digital image signal by a compression unit. The

compressed data is stored as an image file into a recording unit such as a memory card.

In some cases, the image sensing apparatus is connected to a computer via a transmission/reception unit such as a USB unit, and the image file stored in the memory card is transmitted from the image sensing apparatus to the computer. However, when the computer enters a suspended status as a low electric consumption mode, the data transmission/reception unit of the computer is not operative, therefore the image file cannot be transmitted from the image sensing apparatus to the computer. Once the computer has entered the suspended status, to transmit the image file again from the image sensing apparatus to the computer, it is conventionally necessary to bring the transmission/reception unit such as a USB unit into operative status to release the suspended status, by e.g. depressing a particular switch of the computer.

However, in the above-described image sensing apparatus, to restore the computer from the suspended status as a low electric consumption mode and bring the transmission/reception unit such as a USB unit into the operative status, a user, who is even operating the image sensing apparatus, must move the hands off the apparatus and operate the computer. This is troublesome, and further, the user might miss a shutter chance while

he/she operates the computer.

SUMMARY OF THE INVENTION

5 Accordingly, the present invention has been made
in consideration of the above problem, and has its
object to provide an image sensing apparatus which
improves operability in transmission of image data to a
computer or the like, a control method for the apparatus,
10 and a storage medium.

To solve the above-described problem and attain
the object, an image sensing apparatus according to the
present invention has the following construction.

That is, provided is an image sensing apparatus
15 comprising: image sensing means for image-sensing an
object and outputting an image signal; signal processing
means for converting the image signal outputted from the
image sensing means into digital image data;
transmission/reception means for transmitting/receiving
20 data with an information processing apparatus connected
to the image sensing apparatus via a cable or wireless
communication; and signal generation means for
generating a trigger signal to perform image-sensing
related operation, wherein if the image sensing
25 apparatus and the information processing apparatus are
connected to each other and the information processing

apparatus is in a suspended status, the image sensing apparatus transmits a resume signal via the transmission/reception means to the information processing apparatus, in accordance with the trigger
5 signal.

Further, an image sensing apparatus control method according to the present invention has the following construction.

That is, provided is a control method for an image
10 sensing apparatus comprising: image sensing means for image-sensing an object and outputting an image signal; signal processing means for converting the image signal outputted from the image sensing means into digital image data; transmission/reception means for
15 transmitting/receiving data with an information processing apparatus connected to the image sensing apparatus via a cable or wireless communication; and signal generation means for generating a trigger signal to perform image-sensing related operation, the method
20 comprising a step of, if the image sensing apparatus and the information processing apparatus are connected to each other and the information processing apparatus is in a suspended status, transmitting a resume signal from the image sensing apparatus via the
25 transmission/reception means to the information processing apparatus, in accordance with the trigger

signal.

Further, a storage medium according to the present invention has the following construction.

That is, provided is a storage medium containing a
5 control program for controlling an image sensing
apparatus comprising: image sensing means for image-
sensing an object and outputting an image signal; signal
processing means for converting the image signal
outputted from the image sensing means into digital
10 image data; transmission/reception means for
transmitting/receiving data with an information
processing apparatus connected to the image sensing
apparatus via a cable or wireless communication; and
signal generation means for generating a trigger signal
15 to perform image-sensing related operation, the control
program having code for, if the image sensing apparatus
and the information processing apparatus are connected
to each other and the information processing apparatus
is in a suspended status, transmitting a resume signal
20 from the image sensing apparatus via the
transmission/reception means to the information
processing apparatus, in accordance with the trigger
signal.

Further, an image-sensing method according to the
25 present invention has the following construction.

That is, provided is an image-sensing method in an

image sensing apparatus comprising: image sensing means
for image-sensing an object and outputting an image
signal; signal processing means for converting the image
signal outputted from the image sensing means into
5 digital image data; transmission/reception means for
transmitting/receiving data with an information
processing apparatus connected via a cable or wireless
communication; and signal generation means for
generating a trigger signal to perform image-sensing
10 related operation, the method comprising a step of, if
the image sensing apparatus and the information
processing apparatus are connected to each other and the
information processing apparatus is in a suspended
status, transmitting a resume signal from the image
15 sensing apparatus via the transmission/reception means
to the information processing apparatus, in accordance
with the trigger signal.

Further, a control apparatus according to the
present invention has the following construction.

20 That is, provided is a control apparatus for
controlling an image sensing apparatus comprising: image
sensing means for image-sensing an object and outputting
an image signal; signal processing means for converting
the image signal outputted from the image sensing means
25 into digital image data; transmission/reception means
for transmitting/receiving data with an information

processing apparatus connected via a cable or wireless communication; and signal generation means for generating a trigger signal to perform image-sensing related operation, wherein if the image sensing apparatus and the information processing apparatus are connected to each other and the information processing apparatus is in a suspended status, the control apparatus controls the image sensing apparatus to transmit a resume signal via the transmission/reception means to the information processing apparatus, in accordance with the trigger signal.

Other objects and advantages besides those discussed above shall be apparent to those skilled in the art from the description of a preferred embodiment of the invention which follows. In the description, reference is made to accompanying drawings, which form a part thereof, and which illustrate an example of the invention. Such example, however, is not exhaustive of the various embodiments of the invention, and therefore reference is made to the claims which follow the description for determining the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification,

illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Fig. 1 is a block diagram showing a schematic
5 construction of an image sensing apparatus according to a first embodiment of the present invention;

Fig. 2 is a flowchart showing image sensing operation and image file transmission to a computer by the image sensing apparatus according to the first
10 embodiment;

Fig. 3 is a flowchart showing the image sensing operation and the image file transmission to the computer by the image sensing apparatus according to a second embodiment; and

15 Fig. 4 is a flowchart showing the image sensing operation and the image file transmission to the computer by the image sensing apparatus according to a third embodiment.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will now be described in detail in accordance with the accompanying drawings.

25 (First Embodiment)

Fig. 1 is a block diagram showing the construction

of the image sensing apparatus according to a first embodiment of the present invention.

As shown in Fig. 1, an image sensing apparatus 12 of the present embodiment photoelectric-converts an object image formed via an optical system 1 into an electric signal by an image sensing device 2 such as a CCD, and further converts the signal into a digital image signal by an A/D converter 3 and a signal processing unit 4. The digital image signal is inputted into a memory 5. The digital image signal inputted in the memory 5 is subjected to compression processing using the JPEG method or the like by a compression unit 8, and is stored as a file into the memory 5. The image sensing apparatus 12 of the present embodiment has a control unit 6 and a CPU 7 to control the above-described respective units, a release switch 10 connected to the control unit 6, and a display unit 11. Further, the image sensing apparatus 12 of the present embodiment has a USB I/F circuit 9.

Note that the optical system 1, comprising a lens, an aperture, an optical filter, a shutter and the like, forms an object image on the image sensing device.

Further, the image sensing device 2 is a CCD or the like which converts the object image formed by the optical system 1 into an electric signal.

The A/D converter 3 converts continuous electric

signals outputted from the image sensing device 2 into digital signals.

The signal processing unit 4 generates a digital image signal by performing signal processing on the digitized signal.

The memory 5 is used for temporarily storing the digital image signal outputted from the signal processing unit 4 or storing a file-format digital image signal. The memory 5 comprises an internal memory or an external memory card such as a compact flash memory.

Further, the control unit 6 and the CPU 7 control the overall image sensing apparatus 12.

The compression unit 8 performs compression processing by the JPEG method or the like on the digital image signal outputted from the signal processing unit 4 and temporarily stored in the memory 5.

The USB I/F circuit 9 transmits/receives a digital image signal, transmits/receives control commands, and performs transmission/reception to notify statuses of the computer and the image sensing apparatus, with the computer 13 by a data transmission/reception method based on the USB specification.

According to the USB specification, when the computer enters the suspended status as a low electric consumption mode, any data cannot be transmitted/received between the computer and a device

connected to the computer via a USB
transmission/reception unit. In the USB, data
transmission/reception is performed upon reception of
command from the computer, therefore, if the computer is
5 in the suspended status, any data cannot be transmitted
from the device side to the computer. Once the computer
has entered the suspended status, to transmit/receive
data again in the USB, it is necessary to operate the
computer to release the suspended status or transmit a
10 resume signal from the device side to the computer by
using a remote wake-up function defined in the USB
specification, to release the suspended status of the
computer.

In the image sensing apparatus 12 of the present
15 embodiment, the USB I/F circuit 9 transmits a resume
signal under the control of the control unit 6 and the
CPU 7.

The release switch 10, having at least two
contacts, enters any one of two-stepped statuses in
20 accordance with e.g. the amount of depression of the
switch. In this embodiment, if the release switch 10 is
depressed in part way, a first contact represented as
SW1 is selected, and if the release switch 10 is fully
depressed, a second contact represented as SW2 is
25 selected. When the first contact is selected, image-
sensing preparation operation such as AF or AE is

performed, while when the second contact is selected, image-sensing operation, and digital image-data formation and recording are performed.

Further, in the image sensing apparatus 12 of the present embodiment, as described later, when the first contact of the release switch 10 is selected, the USB I/F circuit 9 transmits a resume signal.

The display unit 11 displays various statuses of the image sensing apparatus under the control of the control unit 6 and the CPU 7, or sequentially displays stored image files in accordance with the user's instruction. The display unit 11 comprises an LCD, a TFT liquid-crystal display or the like.

Next, the operation of the image sensing apparatus having the above construction will be described in a case where the image sensing apparatus, connected with the computer via the USB transmission/reception unit, sequentially forms digital images, stores the images into the memory, and at the same time, transfers the image files in the memory to the computer.

Fig. 2 is a flowchart showing the operation according to the present embodiment.

First, the image sensing apparatus and the computer are connected via the USB I/F circuit 9 (S11). Next, when the user depresses the switch 10 to select the SW1 (S12), the image sensing apparatus performs an

image-sensing preparation operation (S13). Next, in preparation for image file transfer to the computer after image sensing, it is examined whether or not the computer is in the suspended status (S14). If the
5 computer is in the suspended status, a resume signal is transmitted via the USB I/F circuit 9 (S15). If the computer is not in the suspended status, the step of transmitting the resume signal is skipped. Next, it is examined whether or not the contact SW2 has been
10 selected by the user (S16). The checking as to whether or not the contact SW2 has been selected is performed for a predetermined period. If the SW2 has not been depressed after the predetermined period, there is a possibility that the user has stopped image sensing
15 operation. The process returns to step S12 to check whether or not the contact SW1 has been selected. If it is determined at step S16 that the contact SW2 has been selected, image sensing for formation of one digital image is performed, and the image is stored in the
20 memory (S17). Finally, the digital image stored in the memory is transmitted to the computer by using the USB I/F circuit 9 (S18). Thus, the sequence by the image sensing apparatus to form one digital image, store the image into the memory, and transfer the image stored in
25 the memory to the computer, is completed.

Then, the user's instruction for image-sensing

preparation is waited again at step S12.

That is, in the image sensing apparatus of the present embodiment, when an obtained image is transmitted to the computer at the same time of image sensing by the image sensing apparatus, if the user has depressed the switch to select the contact SW1, the image sensing apparatus automatically transmits the resume signal to the computer if the computer is in the suspended status. Accordingly, it is unnecessary for the user to operate the computer to release the suspended status. This user's labor can be removed, and the user can avoid missing a shutter chance.

(Second Embodiment)

In the first embodiment, the image sensing apparatus transmits the resume signal to the computer, triggered by the user's depression of the switch to select the contact SW1.

However, the user does not always depresses the switch to select the contact SW2 to perform image sensing after the depression of the switch to select the contact SW1. In cases other than image sensing, the suspended status of the computer is released even though image file is not transferred to the computer.

In a second embodiment, the image sensing apparatus transmits a resume signal to the computer,

triggered by the user's depression of the switch to select the contact SW2.

The construction of the image sensing apparatus of the second embodiment is the same as that in Fig. 1.

5 Fig. 3 is a flowchart showing the operation of the present embodiment.

First, the image sensing apparatus and the computer are connected by the USB I/F circuit 9 (S21).

Next, when the user depresses the switch to select
10 the contact SW1 (S22), the image sensing apparatus performs image-sensing preparation operation (S23). Next, it is examined whether or not the user has depressed the switch to select the contact SW2 (S24). The checking as to whether or not the contact SW2 has been selected is
15 performed for a predetermined period. If the contact SW2 has not been selected after the predetermined period, there is a possibility that the user has stopped image sensing operation. The process returns to step S22, to check whether or not the contact SW1 has been selected.
20 If it is determined at step S24 that the contact SW2 has been selected, in preparation for image file transfer to the computer after image sensing, it is examined whether or not the computer is in the suspended status (step S25). If the computer is in the suspended status, a
25 resume signal is transmitted via the USB I/F circuit (step S26). If the computer is not in the suspended

status, the step of transmitting the resume signal is
skipped. Then image sensing has performed to form one
digital image, the image is stored into the memory (S27).
Finally, the digital image stored in the memory is
5 transmitted to the computer by using the USB I/F circuit
9 (S28). Thus, the sequence by the image sensing
apparatus to form one digital image, store the image
into the memory, and at the same time, transfer the
image file stored in the memory to the computer is
10 completed.

Then, the user's instruction for image sensing
preparation is waited again at step S22.

That is, in the image sensing apparatus of the
present embodiment, when an obtained image is
15 transmitted to the computer at the same time of image
sensing by the image sensing apparatus, if the user has
depressed the switch to select the contact SW2, the
image sensing apparatus automatically transmits the
resume signal to the computer if the computer is in the
20 suspended status. Accordingly, as in the case of the
first embodiment, it is unnecessary for the user to
operate the computer to release the suspended status.
This user's labor can be removed, and the user can avoid
missing a shutter chance.

25

(Third Embodiment)

In a third embodiment, the image sensing apparatus transmits a resume signal to the computer when the user has depressed the switch to select the contact SW2 then formed and stored digital image data.

5 The construction of the image sensing apparatus according to the third embodiment is the same as that in Fig. 1.

Fig. 4 is a flowchart showing the operation according to the third embodiment.

10 First, the image sensing apparatus and the computer are connected by the USB I/F circuit (S31). Next, if the user has depressed the switch to select the contact SW1 (S32), the image sensing apparatus performs image-sensing preparation operation (S33). Next, it is
15 examined whether or not the user has depressed the switch to select the contact SW2 (S34). The checking as to whether or not the contact SW2 has been selected is performed for a predetermined period. If the contact SW2 has not been selected after the predetermined period,
20 there is a possibility that the user has stopped image sensing operation. The process returns to step S32, to check whether or not the contact SW1 has been selected. If it is determined at step S34 that the contact SW2 has been selected, image sensing is performed to form one
25 digital image, and store the image into the memory (S35). Next, in preparation for image file transfer to the

computer, it is examined whether or not the computer is
in the suspended status (S36). If the computer is in the
suspended status, the resume signal is transmitted via
the USB I/F circuit (S37). If the computer is not in the
5 suspended status, the step of transmitting the resume
signal is skipped. Finally, the digital image stored in
the memory is transmitted to the computer by using the
USB I/F circuit 9 (S38). Thus the sequence by the image
sensing apparatus to form one digital image, store the
10 image into the memory, and at the same time, to transfer
the image file stored in the memory to the computer is
completed.

Then, the user's instruction for image sensing
preparation is waited again at step S32.

15 That is, in the image sensing apparatus of the
present embodiment, when an obtained image is
transmitted to the computer at the same time of image
sensing by the image sensing apparatus, if the user has
depressed the switch to select the contact SW2 and
20 performed image sensing to form and store digital image
data, the image sensing apparatus automatically
transmits the resume signal to the computer if the
computer is in the suspended status. Accordingly, as in
the case of the first and second embodiments, it is
25 unnecessary for the user to operate the computer to
release the suspended status. This user's labor can be

removed, and the user can avoid missing a shutter chance.

Note that in addition to the above-described three
embodiments, if it is arranged such that the image
sensing apparatus automatically transmits a resume
5 signal to the computer if it is in the suspend status
when the user depresses an arbitrary switch of the image
sensing apparatus, as in the case of the above
embodiments, it is unnecessary for the user to operate
the computer to release the suspended status. This
10 user's labor can be removed, and the user can avoid
missing a shutter chance.

Further, in any of the above embodiments, as
information as to whether or not the USB-connected
computer is in the suspended status is displayed on the
15 display unit 11 in Fig. 1, the user obtains information
on the suspended status of the computer while operating
the image sensing apparatus.

Further, in the above embodiments, the resume
signal is transmitted in accordance with manipulation on
20 the shutter button by the user, however, the present
invention is not limited to this arrangement. For
example, in a case where automatic image sensing is
performed intermittently at predetermined intervals, it
may be arranged such that the resume signal is
25 automatically transmitted upon each image sensing
without the user's manual switch operation.

Further, the image sensing apparatus according to the present invention is not limited to a camera but may be any device to pick up an image and transmits an image signal.

5 Further, in the present invention, the image-sensing unit and the control device may be provided in one casing or may be provided in separate casings and connected with each other via a cable or wireless communication.

10

(Other Embodiment)

The present invention can be applied to a system constituted by a plurality of devices (e.g., a host computer, an interface, a reader and a printer) or to an
15 apparatus comprising a single device (e.g., a copy machine or a facsimile apparatus).

Further, the object of the present invention can be also achieved by providing a storage medium storing program code for performing the aforesaid processes to a
20 system or an apparatus, reading the program code with a computer (e.g., CPU, MPU) of the system or apparatus from the storage medium, then executing the program. In this case, the program code read from the storage medium realizes the functions according to the embodiments, and
25 the storage medium storing the program code constitutes the invention. Furthermore, besides aforesaid functions

according to the above embodiments are realized by
executing the program code which is read by a computer,
the present invention includes a case where an OS
(operating system) or the like working on the computer
5 performs a part or entire processes in accordance with
designations of the program code and realizes functions
according to the above embodiments.

Furthermore, the present invention also includes a
case where, after the program code read from the storage
10 medium is written in a function expansion card which is
inserted into the computer or in a memory provided in a
function expansion unit which is connected to the
computer, CPU or the like contained in the function
expansion card or unit performs a part or entire process
15 in accordance with designations of the program code and
realizes functions of the above embodiments.

In a case where the present invention is applied
to the aforesaid storage medium, the storage medium
stores program code corresponding to the flowcharts
20 (Figs. 2 to 4) described in the embodiments.

As described above, according to the present
invention, it is unnecessary for the user to operate the
computer to release the suspended status. This user's
labor can be removed, and the user can avoid missing a
25 shutter chance by operating the computer.

The present invention is not limited to the above

